

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Canceled)
2. (Currently amended): A storage controller for exchanging user data between a host system and a data storage unit comprising:
 - a at least one microprocessor;
 - a local memory for a control program and for in-memory management information; and
 - a cache memory for the user data, the cache memory storing therein in-cache management information, the in-memory management information being representative of the in-cache management information, the in-memory management information and the in-cache management information each being information relating to user data that is stored in the cache memory,
 - an access time between the microprocessor and the local memory to perform an access operation being lower than an access time between the microprocessor and the cache memory for the same access operation,
 - the local memory and the cache memory storing management information that is used only by the at least one microprocessor,
 - the local memory and the cache memory exclusive of management information that is used by any microprocessor other than the at least one microprocessor,
 - the control program configured to operate the microprocessor to process a read request by performing steps of:
 - accessing the local memory to access the in-memory management information;
 - based on the in-memory management information, determining whether read-out data associated with the read request is stored in the cache memory;

if the read-out data is stored in the cache memory, then accessing the cache memory to access the read-out data;

if the read-out data is not stored in the cache memory, then:

accessing the data storage unit to access the read-out data;

storing the read-out data in the cache memory; and

updating the in-memory management information and the in-cache management information to indicate an update of the cache memory.

3. (Previously presented): The storage controller of claim 2 wherein the control program is further configured to operate the microprocessor to process a write request by performing steps of:

accessing the local memory to access the in-memory management information;

based on the in-memory management information, identifying a vacant area in the cache memory;

storing write data associated with the write request into the vacant area; and

updating the in-memory management information and the in-cache management information to indicate an update of the cache memory.

4. (Previously presented): The storage controller of claim 2 wherein the local memory is accessible only by the microprocessor.

5. (Previously presented): The storage controller of claim 4 wherein the local memory is a component of the microprocessor.

6. (Currently amended): A subsystem comprising a storage control unit and a plurality of storage units for storing data from a host computer, the storage control unit comprising:

a cache memory for user data that is transferred between the host computer and the storage units; and

a-at least one processor operable to control the storage control unit, the processor having a local memory for a control program and for management information relating to data stored in the cache memory,

wherein the processor can access the local memory at a higher speed than the cache memory,

the local memory and the cache memory storing management information that is used only by the at least one processor,

the local memory and the cache memory exclusive of management information that is used by any processor other than the at least one processor,

the control program configured to operate the processor to:

access the management information in the local memory, in response to a write operation, to identify available space in the cache memory in order to store data associated with the write operation; and

access the management information in the local memory, in response to a read operation, to determine if requested data associated with the read operation is contained in the cache memory, and if not then to:

access the management information in the local memory to identify available space in the cache memory in order to store the requested data; obtain the requested data from the storage units; and store the requested data into the available space in the cache memory.

7. (Previously presented): The subsystem according to claim 6 wherein the memory in the processor is a volatile memory.

8. (Previously presented): The subsystem according to claim 6 wherein the management information is also stored in the cache memory.

9. (Previously presented): The subsystem according to claim 8 wherein the processor updates the management information in the cache memory together with the management information in the processor.

10. (Previously presented): The subsystem according to claim 6 wherein the storage units have a RAID configuration.

11. (Previously presented): The subsystem according to claim 6 wherein the storage units are magnetic disk units.

12. (Currently amended): A storage control unit for data communication with a plurality of storage units and with at least one host computer comprising:

a first control unit for communication with the host computer;

a second control unit for communication with the storage units;

a cache memory for user data being transferred between the host computer and the storage units, the cache memory storing management information relating to user data that is stored in the cache memory;

a data transfer control unit configured to transfer data between the first control unit and the cache memory, and between the second control unit and the cache memory; and

a-at least one processor for controlling the storage control unit, the processor having therein a local memory, for storing the management information,

the local memory and the cache memory storing management information that is used only by the at least one processor,

the local memory and the cache memory exclusive of management information that is used by any processor other than the at least one processor,

wherein the processor, responsive to an operation to write data or to read data, is configured:

to access the management information that is stored in the local memory;
to determine if the cache memory can accommodate the operation; and

if the cache memory can accommodate the operation, then to access the cache memory to store the write data or the read data in the cache memory..

13. (Previously presented): The storage controller according to claim 12 wherein the access speed between the processor and the local memory is higher than the access speed between the processor and the cache memory.

14. (Previously presented): The storage controller according to claim 12 wherein the data transfer control unit copies the management information from the cache memory to the local memory.

15. (Previously presented): The storage controller according to claim 12 wherein the data transfer control unit copies the management information from the local memory to the cache memory.

16. (Currently amended): A subsystem comprising a storage control unit and a plurality of storage units for storing data from a host computer wherein the storage control unit includes:

a cache memory for temporarily storing data transferred between the host computer and the storage units and for storing management information relating to user data that is stored in the cache memory; and

a-at least one processor for controlling the storage control unit, the processor having therein a local memory,

the processor being configured to store in the local memory at least a portion of the management information relating to the data stored in the cache memory,

the processor further being configured to access the management information in the local memory to determine if the cache memory can accommodate an operation to write data or to read data and to access the cache memory to store write data or read data in the cache memory if the cache memory can accommodate the operation[.]₂

the local memory and the cache memory storing management information that is used only by the at least one processor,

the local memory and the cache memory exclusive of management information that is used by any processor other than the at least one processor.

17. (Previously presented): The subsystem according to claim 16 wherein the memory in the processor stores a control program for controlling the storage control unit.

18. (Previously presented): The subsystem according to claim 16 wherein the local memory is a volatile memory.

19. (Previously presented): The subsystem according to claim 16 wherein the management information includes at least one of a data attribute for managing the data in the cache memory, a logical address of the data in the cache memory, available storage area information in the cache memory, or management information regarding an order of priority of replacing contents of the cache memory.

20. (Previously presented): The subsystem according to claim 19 further comprising a data transfer control unit for transferring the user data in the cache memory between the host computer and the storage units.

21. (Previously presented): The subsystem according to claim 16 wherein the processor updates the management information in the cache memory and in the local memory.